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ABSTRACT

A highly interactive multicamera-multimonitor closed circuit television system is described which permits a resource room teacher and her handicapped elementary school students to be in continuous visual communication with one another. On the basis of relatively short-term observation, data is reported to show that the system is of most help to partially sighted students, although it is also beneficial for educable mentally retarded and hearing impaired children. Appendixes contain data on the measurement of x-rays associated with closed circuit television monitors, tests that have been administered to the students, and entries from the teacher's log regarding the use of the current teacher-student system. (GW)

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March 1974

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A highly interactive multicamera-multimonitor closed circuit TV system is described which permits a teacher and her handicapped students to be in continuous visual communication with one another. This system is being proof tested in a resource room for handicapped children in an elementary school in Santa Monica, California. Although it is too soon to make definitive statements regarding the value of the system in educating handicapped children, teacher and project staff observation to date indicates that it is not only proving to be of great help to partially sighted children, but that it is also assisting those who are educable mentally retarded or hearing impaired.

The research reported in this paper was made possible by a grant from the Social and Rehabilitation Service of the U.S. Department of Health, Education and Welfare.

Preface

This paper contains information concerning some of the research being carried out by members of the staff of the Rand Corporation with a grant, 14-P-55846/9, from the Social and Rehabilitation Service of the U.S. Department of Health, Education and Welfare, to study and try to solve some of the information transfer problems of the partially sighted. It contains a description of an interactive multicamera-multimonitor closed circuit TV system which was designed, fabricated and assembled by members of the project staff. This interactive CCTV system permits a teacher to be in continuous visual communication with her partially sighted students. The system has been installed and is being used in a resource room for handicapped elementary school children under the jurisdiction of the Santa Monica Unified School District. While some of the students in the resource room are partially sighted, others are educable mentally retarded, profoundly deaf or partially hearing and some are multiply handicapped. Even though the system has been in use in the resource room only since mid-November 1973 it has already proven to be helpful to not only the partially sighted students but also to the other handicapped children as well.

Introduction

During the past year we designed and fabricated a highly interactive teacher-student closed circuit TV system. This multicamera-multimonitor instrument is being proof tested for its reliability and design rationality during the 1973-74 academic year in an elementary school resource room for partially sighted, mentally retarded and hearing impaired school children in Santa Monica, California. The system permits a teacher and her handicapped students to be in continuous visual communication with each other. It was originally built to satisfy the need for continuous visual links between partially sighted students and their teachers, and in that capacity, the system has already shown great promise.* The system is being used primarily by partially sighted and/or educable mentally retarded students, some of whom have additional physical handicaps. Although it is too early to make predictions concerning the long range value of the system to the educable mentally retarded and to the teaching of the educable mentally retarded, teacher observation to date indicates that with the teacher-student system the attention span of the educable mentally retarded students who are using it has increased considerably. However, there is not sufficient evidence as yet to make a definitive statement about the system's capacity to increase attention span over a long period of use.

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*In Ref. 1 the author carefully defined who the partially sighted are and estimated that about 305,000 of the 436,000 legally blind Americans are partially sighted as well as about 1,330,000 Americans who are not legally blind.

The system is also being used by deaf and partially hearing children and their teacher, who reports to us that those children are very enthusiastic about working with it, and that she is finding it very helpful in improving communications with those students.*

With the system, for example, handicapped children are able to see their teacher writing at her desk or on a chalkboard while she is actually writing and explaining what she is doing. No longer is it necessary for her partially sighted students to ascertain what she is writing after she has completed writing and after she has given an explanation of what she is writing. The ability to see what a teacher is writing while she is actually writing and explaining what she is doing is a vital factor in a student's ability to fully comprehend what is being taught.

In addition, the teacher-student system permits students, while seated in a comfortable and natural position, to work alone at its camera-monitor stations where, for example, they can read ordinary printed and handwritten material, write with a pen or pencil and carry on other operations that require precise eye-hand coordination. Further, like currently available individualized closed circuit TV systems for the partially sighted, the teacher-student system's cameras and monitors also permit the control, by teacher and students, of image brightness contrast, polarity and magnification to a far greater extent

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*In Ref. 2, the authors estimated that there are about 180,000 partially sighted, 490,000 hearing impaired and 2,100,000 educable mentally retarded Americans between the ages of 0 and 21 years.

and with much greater ease then is possible with pure optical devices. While pure optical systems can provide the same degree of magnification as closed circuit TV systems, unlike the latter, they must be kept at a rather precise distance from the viewed object to keep it in focus especially at high magnifications. Further, unlike closed circuit TV systems, pure optical systems are incapable of reversing image contrast (i.e., turning black into white and white into black), and hence, are unable to provide partially sighted users with an image of print that scatters less light and that provides illumination from the information rather then from the matrix in which it is imbedded. The absence of these two constraints on closed circuit TV systems make them more attractive to the partially sighted than pure optical systems, because those constraints are the cause of much of the fatigue experienced by partially sighted people when they have tried to read with the aid of pure optical devices for long periods of time. One other advantage of closed circuit TV systems over pure optical systems that has proven invaluable to the partially sighted is their ability to enhance both the brightness and contrast of a viewed object. With this capability and that of contrast reversal, the partially sighted are now able, for example, to view an image of low contrast printed or handwritten material which is bright, has high contrast and which minimizes glare.*

*For additional information concerning closed circuit TV systems for the partially sighted, the reader is directed to Refs. 3 through 10.

The Teacher-Student System

The teacher-student system has four stations, each consisting of (1) a black and white TV monitor and stand, (2) a down pointing black and white TV camera which generates images with normal or reversed contrast (i.e., black on white or white on black) selected by a switch on the front or underface of the camera, (3) a 5 to 1 zoom lens with a close-up adapter, (4) a heat shielded light source, (5) an X-Y Platform with adjustable margin stops in the x-direction and frictional control in the y-direction and (6) a stand which accommodates the TV camera, the light source and the X-Y Platform. In addition, each station is provided with a switch which permits its light source to be turned on or off, another switch which allows power to flow or to be cut off from all of its electrical components, and an amber light which when illuminated indicates that the image displayed on the station's monitor is also being displayed on the room monitor.

The system includes a ceiling mounted room-viewing black and white TV camera equipped with a 10 to 1 zoom lens, a black and white room monitor, cartridge type videotape recorder, a master control unit, a remote control unit for the ceiling camera and a teacher's channel selector.

Each of the camera-monitor stations is located on its own table. Three of these stations are specifically for use by students and the fourth is for use by the teacher, although that station can and is used on occasion by a fourth student.

Figure 1 shows one of the three student stations and Fig. 2 shows the teacher's station. In the latter photograph note the videotape recorder to the left of the TV monitor and the master control unit and remote camera control unit on the right of the desk which supports the camera and monitor stands. In the same photograph the teacher's channel selector is shown to the left of the X-Y Platform and in front of the TV monitor.

The master control unit (see Fig. 3) is located on the same table as the teacher's camera-monitor station. With it, the teacher is able to present on any one of the four desk supported TV monitors, independently of what she presents on any other monitor, (1) a full screen image of what any one of the five TV cameras is viewing or of a videotaped picture, (2) a horizontally split image of what any two of the five cameras are viewing or of a videotaped picture and what any one of the five cameras is looking at, or (3) a full screen superposition of what any two of the five cameras are viewing or of a taped image and what any one of the five cameras is looking at. With this capability the teacher is able to work simultaneously with as many as three students, and if she chooses to work with fewer than three students, she will still be able to assign tasks, involving the use of the teacher-student system to those students she is not working with. Those tasks may involve the students working alone or with occasional observation or guidance from the teacher. The teacher might, for example, do any one of the following three things:

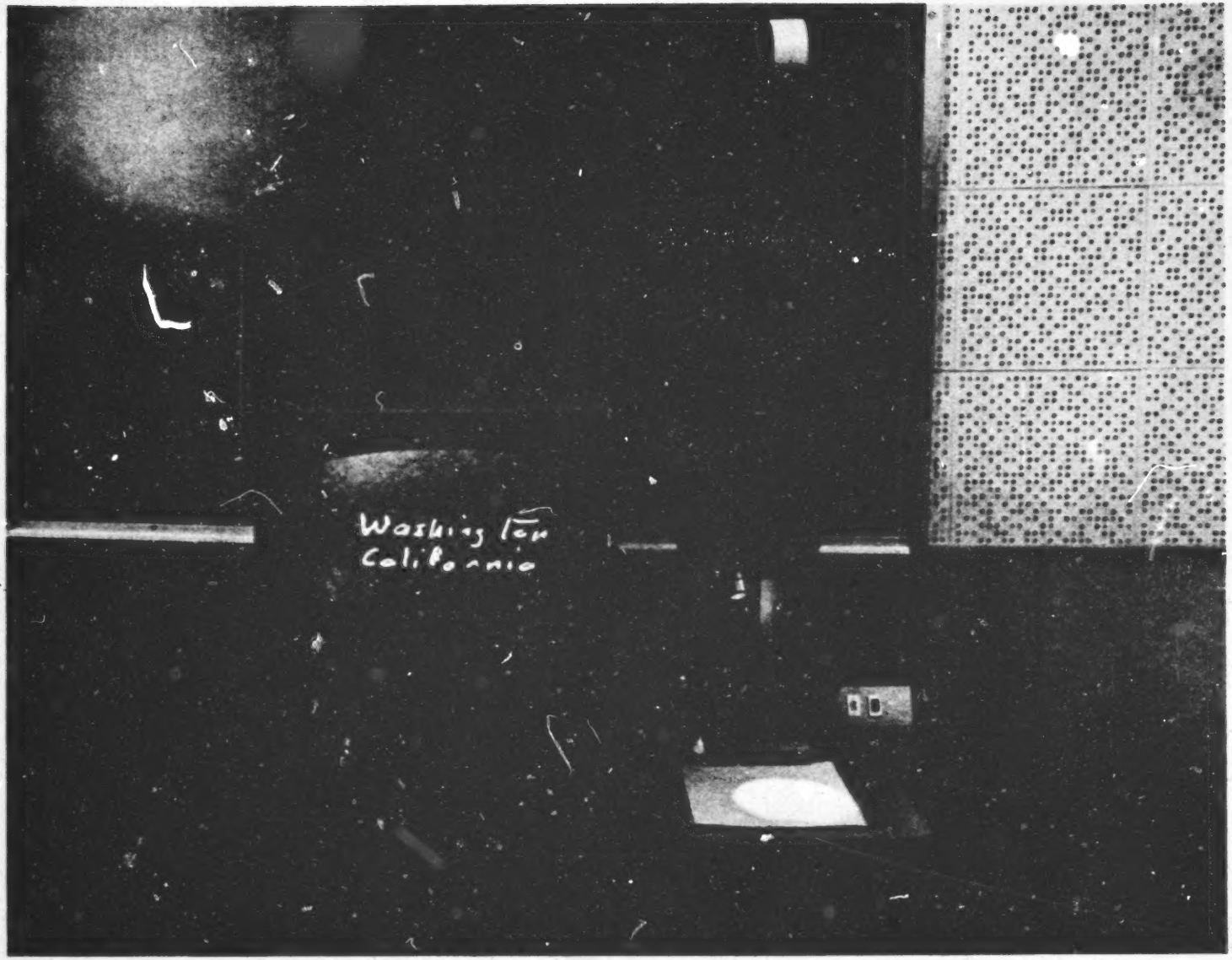

Fig. 1 A Student Camera-Monitor Station

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Fig. 2. The Teacher's Camera-Monitor and Control Station

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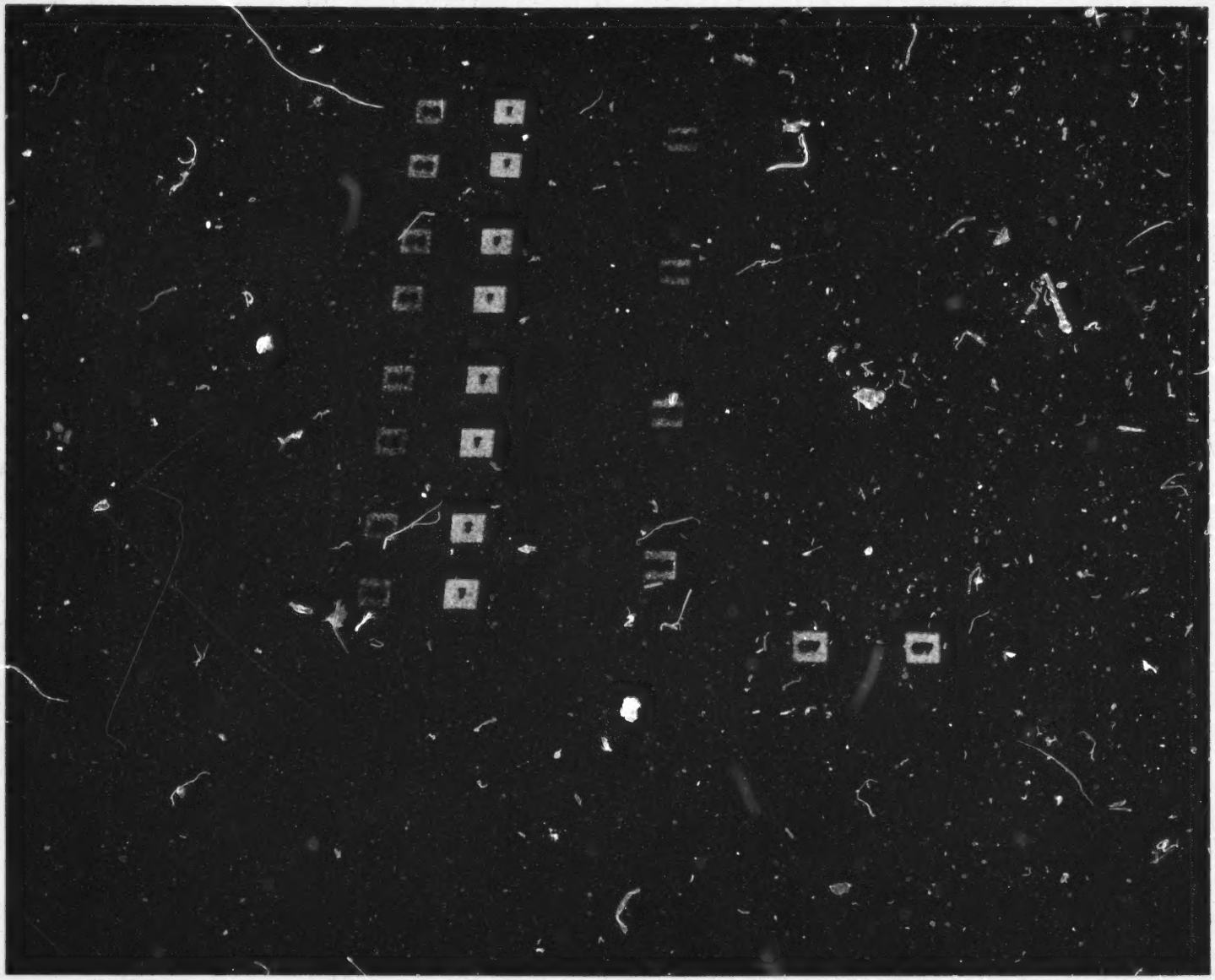

Fig. 3. The Master Control Unit

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(1) (a) Present on student one's monitor a full screen image of what his camera is viewing and ask him to place a book on his X-Y Platform and to read by himself.

(b) Place a set of small pictures of various objects on her X-Y Platform, ask students two and three to place sheets of clean white paper on their respective X-Y Platforms, and then present on student two's monitor a superimposed image of what her (the teacher's) camera is viewing and of what his camera is looking at, and on student three's monitor a superimposed image of what her (the teacher's) camera is viewing and what his camera is looking at. She could then ask students two and three to circle the pictures they see on their monitors that begin with a particular letter and to write that letter next to the circled picture.

(2) (a) Display a horizontally split image on the monitor on student one's desk of what his camera is viewing and of what the room-viewing camera is looking at. If, for example, the room-viewing camera is trained on a model of a famous ship, she could then ask student one to put a piece of clean white paper on his X-Y Platform and draw a sketch of the ship or write an essay about it.

(b) Display a full screen image of a videotaped lesson on student two's monitor and ask him to view it by himself.

(c) Display on student three's monitor a full screen image of what the camera at his desk is looking at, ask him to place a book on his X-Y Platform, and then go to that student's desk and work directly with him.

(3) Present a full screen image of what the room-viewing camera is looking at on all three student monitors and on her own monitor, use puppets or other props which are viewed by the room-viewing camera to help her tell a story, and then ask the students questions based upon the story. The latter activity might involve the use of the puppets or the chalkboard.

Using the "teacher's channel selector" the teacher could view individually but in any order on her own monitor what any of the students is seeing on his monitor, and, for instance, in example (1) above, she could watch what students two or three are viewing on their monitors. Thus, she could point out mistakes to each of those students separately without going to their desks. Likewise if either student does something which the teacher believes needs reenforcing and which she is confident will not embarrass the child, she could display his success on other student monitors while complimenting his good work. In general, and in this example in particular, the teacher can use the teacher's channel selector to occasionally observe the performance of students whom she has asked to work alone, and when necessary, give them help or encouragement.

The examples given above are illustrative of what a teacher-student system can do, and each of the activities described in those examples has been devised and carried out by Ms. J. von der Lieth, the teacher in the resource room where our system is being proof tested.

As pointed out earlier in this report, the remote camera control unit (see Fig. 4), like the master control unit and the teacher's channel selector, is located on the teacher's desk. With it the teacher can cause the room-viewing camera to pan and tilt and present a positive or negative image (i.e., black on white or white on black) on one or more TV monitors. It will also allow the teacher to control the opening of the zoom lens, bring objects into focus and change the magnification provided by that lens.

The videotape recorder is used by the teacher to record in class visual interactions like most of those described above, to prepare taped lessons, and to display those lessons as well as other taped material.

The room monitor is used by nonvisually impaired students to watch replicas of material being displayed on one or more station monitors, especially when all the station monitors are being used by partially sighted students and/or the teacher. This permits the nonvisually impaired students to participate in the same group activities as the partially sighted students by viewing the same material on the room monitor as the partially sighted are viewing on station monitors. Since the nonvisually impaired students can easily see what they are writing without having to bring their eyes close to the paper upon which they are writing or without bringing the paper close to their eyes, they are able to watch the room monitor at a distance and when and

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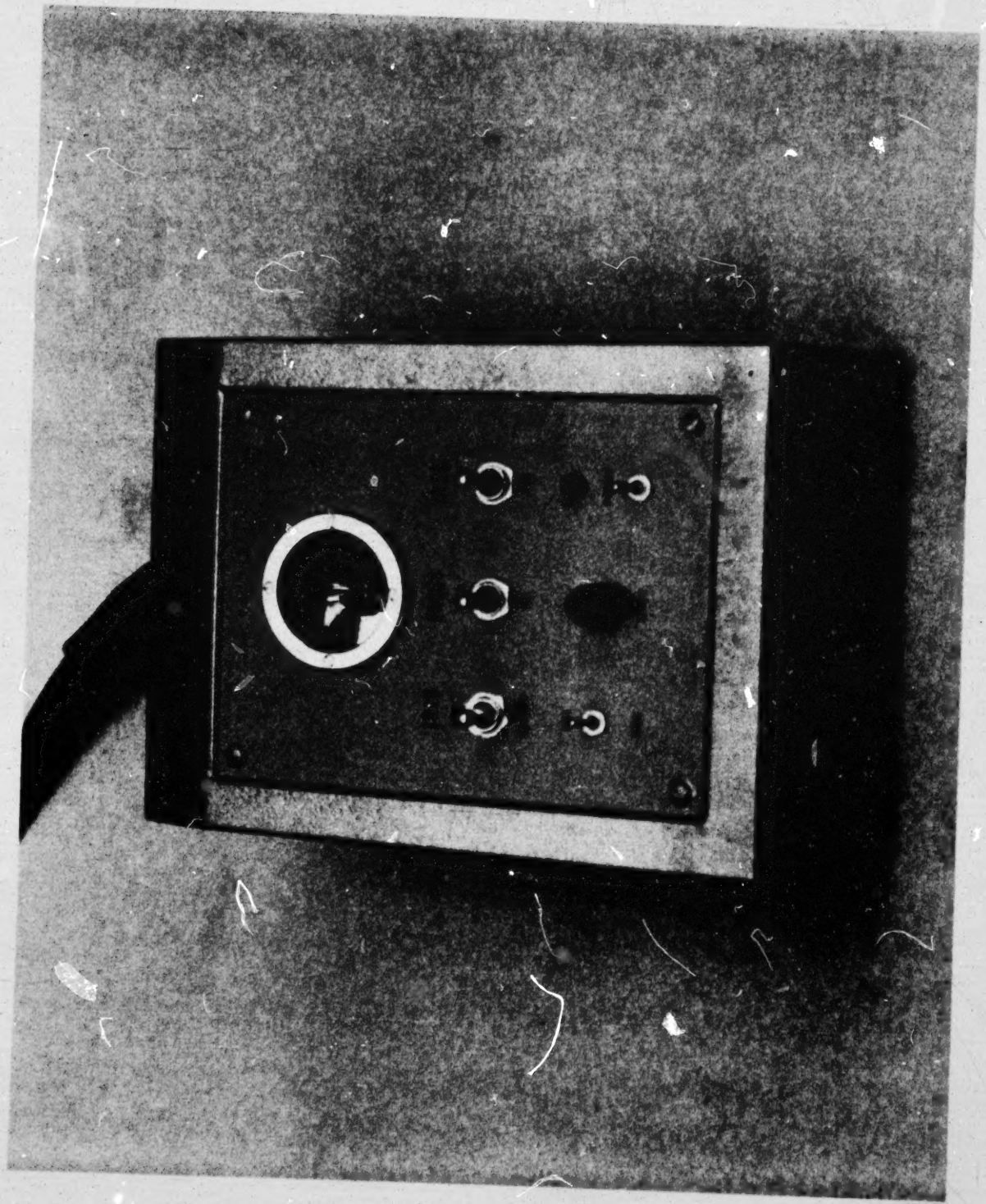

Fig. 4. The Remote (Room-Viewing) Camera Control Unit

if writing is called for, they can cope with it visually without any difficulty.*

All the TV monitors programmed for use in the teacher-student system have been thoroughly checked by a reputable testing firm to ensure that they present no x-radiation hazard to anyone who uses them for long periods of time while seated very close to their face plates. A copy of the letter from J. L. Shepherd and Associates dated September 18, 1973 attesting to the safety of all the monitors which have been programmed for use in the teacher-student system makes up Appendix A of this paper.

When we were designing the teacher-student system, we considered a large number of features for inclusion in that design and in many cases actually experimented with them in our laboratory. Some of those features were rejected because we found that what they would contribute to overall instrument design could not be justified from the standpoint of cost or utility, or could be accomplished equally well by the incorporation of one or more less costly features. For example, we explored the advisability of incorporating into the system special

*At least one of the educable mentally retarded but non-visually impaired students prefers to sit at a table with a partially sighted student and view the station monitor that the partially sighted student is looking at. Since the teacher-student system's four stations are clustered together in a tight square and the other desks in the classroom are somewhat isolated from that square, this educable mentally retarded student's behavior may indicate a desire to be in closer physical contact with the teacher and the partially sighted students.

effects equipment which would produce either an overlay of two images or a split image on a monitor screen that is divided horizontally, vertically and/or diagonally. However, we found that for most activities expected to take place in a classroom, the diagonal split was of little value and the vertical split was distinctly inferior to the horizontal split. The success of most writing and reading activities depends more upon maximizing the extent of information in the horizontal direction than in the vertical or diagonal directions. We therefore decided to use only the horizontal split and the overlay special effects which simplified instrument design and cut costs.

Among the other features we considered and rejected were the use of color television, high resolution cameras and monitors and low resolution TV equipment. The first item was rejected on the grounds that (1) quality color television is much more expensive than black and white equipment, and (2) most of the materials used in a classroom can be seen at least as clearly with black and white TV as with color TV. The second item was rejected on the grounds that it increased system cost and that it did little or nothing to improve the ease with which most of the partially sighted can read and write with the aid of a closed circuit TV system. This is probably attributable in large measure to the fact that most partially sighted people do not see details in letter construction, such as serifs, when they are reading and yet can read printed and handwritten material and can write

with a pen or pencil with ease even when the image of that material is not in sharpest focus, but is sufficiently in focus to permit unambiguous recognition of individual alphanumeric symbols. The third item was rejected on the grounds that standard 525 line cameras and monitors are readily available and provide better resolution than lower resolution equipment at less cost.

While we make no claim that the precise mix of features that will prove to be of greatest value to handicapped children and their teachers are incorporated into the design of the current teacher-student system, we nevertheless believe that we have included all or nearly all of the features that a teacher may need to establish and maintain continuous visual communication with her handicapped students.

The Proof Testing of the Teacher-Student System

As pointed out earlier in this paper, the teacher-student system is being proof tested in a resource room for physically and mentally handicapped elementary school children in Santa Monica, California during the academic year 1973-74. We believe this testing to be very important, because it is providing valuable data concerning how such a system can be used and what features it should have in order to meet the needs of the teacher and her handicapped students. Initially we regarded the proof testing of the system in the resource room to be a means for determining whether (1) the system and its components operate reliably, (2) the features included in the design are useful and adequate, and (3) the teacher is able to operate the system with ease and without hindering her ability to teach. However, the enthusiastic response to the system by the teacher and her students led us to recognize rapidly that data should also be gathered concerning each student's level of achievement, attitude toward himself and his schooling, eye-hand coordination and attention span. Some of this data has already been collected using various psychological and educational tests or instruments, and additional data will be collected before the end of this academic year. A list of the instruments that have been administered is given in Appendix B. This data plus that contained in the daily log kept by the teacher, Ms. J. von der Lieth, will help us judge the strengths and weaknesses of teaching with the

aid of a teacher-student system. The information contained in Ms. von der Lieth's log, plus that which we acquire as a result of our conversations with her and her students and from our first-hand observations in her classroom, will also help us to discover modifications in system design that should be incorporated into future teacher-student systems.

Ms. von der Lieth not only uses the teacher-student system to maintain continuous visual communication with her students while teaching, but also to develop teaching techniques appropriate for use with the system and tailored to the needs of the target population.

Appendix C contains excerpts from Ms. von der Lieth's daily log. Each student's name has been replaced by a capital letter.

Experience with the teacher-student system indicates that equipment breakdown occurs very infrequently,* but that project personnel are needed rather often during the first month or two after the system is installed and operating to assist the teacher with little problems which do not involve the integrity of the equipment, but which do reflect an uncertainty as to how to operate it.

Members of our project staff meet at least once every two weeks with the teacher in order to keep abreast of how the

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*Since being installed in Ms. von der Lieth's classroom in mid-November, the teacher-student system has only been out of operation one day.

experiment is progressing and to learn what problems, if any, have been encountered and how our staff might help to alleviate those problems. The teacher has a free hand in designing the curriculum and in selecting and presenting course material. However, qualified members of our staff, when requested, assist her in adapting materials for use with the teacher-student systems. For example, since much oversized material is currently in use in classrooms and resource rooms for the partially sighted, it is sometimes advisable to reduce that material to normal or even smaller dimensions when using it in conjunction with a teacher-student system. We provide the technical assistance needed to cope with this problem.

We were fortunate in our decision to proof-test our teacher-student system in a resource room operated by the Santa Monica Unified School District, because Dr. F. D. Taylor, Assistant Superintendent for Special Services in that district, and his staff have cooperated fully with us and have provided us with the materials and services needed to make the experiment work.

The fact that our teacher-student system is being used by elementary school children and not by children at another educational level is somewhat fortuitous. Nevertheless, we believe that children at the elementary level probably can benefit most from it because (1) handicapped students at this educational level tend to spend more time in classrooms or resource rooms for the handicapped than those who are in junior

high school or senior high school, (2) more control can be maintained over the educational environment at this level than at more advanced educational levels, (3) basic skills are taught at this level which, if thoroughly learned, give a student a sound basis for progressing to higher educational levels and if poorly learned will tend to handicap him educationally for many years and perhaps throughout his entire educational experience, and (4) less effort need be spent in assisting students to adjust to the altered educational environment created by the use of a teacher-student system at this level than at more advanced levels.

All the participating students and some of their parents and guardians have visited our RANDSIGHT research facility at Rand, Santa Monica. This was done so that (1) we could become acquainted with those people, (2) they could learn first hand about our research and our attitudes about handicapped children, (3) we could give students personal instruction in how to operate a closed circuit TV system and use it to best advantage for both reading and writing and (4) we could make measurements, particularly with respect to visual acuity, size and geometry of visual field and color perception and gather other data needed to evaluate the results of the classroom experiment. All data collected during such visits is treated in the strictest confidence and used only in ways that protect the privacy and anonymity of the students and their families.

Speculative Remarks

While it is too early as yet to judge the success of our teacher-student system based upon data collected via various psychological and educational instruments administered periodically over a long period of time, nevertheless, as pointed out earlier, teacher observation indicates that it certainly is proving to be of value in teaching partially sighted students, and that there are indications that it also appears to be of help to hearing impaired and educable mentally retarded students.* There is no indication to date that student interest in and enthusiasm toward the teacher-student system is beginning to wane. We had thought that this might take place particularly among those students who are not visually impaired, because they were not expected to find the visual link that the system provides to be as important as it would be to the partially sighted. Even so we are not ready as yet to speculate upon the impact which teacher-student systems may have on the education of

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*Ms. von der Lieth conjectures that the small field of view of a TV camera, compared with that of the human eye, may be indirectly responsible for some of the progress her students are making in arithmetic, for example. She points out that they have become more aware of fractional parts and their relation to the whole since they have had to view, on their TV monitors, two or more parts of various pictures (especially at large magnifications) in order to determine with a reasonable degree of certainty, the content of the overall picture. She also conjectures that the strong affinity her students have shown toward using the teacher-student system may be due, at least in part, to the fact that when they are seated at its stations, they are less distracted and more comfortably constrained than they would be in an ordinary classroom. While all of her students share this attraction for and security with the system, these manifestations appear to be more pronounced among those who are educable mentally retarded.

nonvisually impaired handicapped children. We will hold ourselves in check regarding those children until more test data has been gathered and analyzed. We probably should take the same position relative to the partially sighted, but here the situation is a bit different, because one does not need the results of psychological and educational instruments to observe that with the teacher-student system partially sighted students are able to be in continuous visual contact with their teacher in ways that commonly occur in classrooms for "normal" children but that are impossible for partially sighted students to handle without the help of such a system. Even here, though, the validity of what we are about to say depends to some extent upon how well partially sighted elementary school children learn basic skills with the aid of a teacher-student system. The decision as to how well they are able to perform with it should be based upon the results obtained with test instruments as well as the personal observation of visual interactions between teacher and students with and without the help of the system. Having made these caveats, we feel free to conjecture that, relative to elementary education involving the acquisition of basic skills, e.g., reading, writing and arithmetic, it may prove advisable to place partially sighted students in classrooms of their own and, in those classrooms, to thoroughly teach them the basic skills with the aid of teacher-student systems and also to instruct them in how to obtain the maximum benefit from the complete range of other visual aids such as binoculars, monoculars

and telescopic spectacles which they may be able to use to establish and maintain visual communication with their teachers when they have acquired the basic skills and have shifted into classes primarily for nonhandicapped children.*

We recognize that calling for special classrooms for partially sighted students, even for only the early years of elementary education, may be viewed as a retrogressive suggestion; however, in view of the success we are having with our teacher-student system in establishing and maintaining continuous visual communication between partially sighted students and their teacher, we believe that currently accepted theories regarding the early education of the partially sighted may need reexamination. When the decision was made to move partially sighted children from special classes into integrated classes with "normals", our nation's practical technological sophistication was not as good as it is today, and hence there is reason to believe that in the light of current practical technology a

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*Wherever possible the eyes of partially sighted students should not only be examined periodically by an ophthalmologist but they should also be examined periodically by a qualified clinician who is either in private practice or who is associated with a low vision clinic and who is equipped to determine whether one or more of the wide variety of optical and electro-optical aids currently available may be of benefit to such students.

modification of that decision might be appropriate.* While we agree that decisions as to how we should educate our children should not be made lightly, we nevertheless believe that they should be made in the light of current knowledge and with the full realization that the body of knowledge changes with time, and hence a decision which appeared to be right yesterday may not be appropriate for today.

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*This statement is not only true regarding the education of partially sighted children, but is also valid regarding the education of other handicapped children as well. For example, the successful development in the 1960s of electro-optical to tactile reading aids, such as the Optacon, brought into question the applicability of decisions made prior to the 60s to refrain from teaching the functionally blind how to read ordinary printed or handwritten correspondence, magazine articles and other short pieces of conventional written material.

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J L SHEPHERD and Associates

703 So. Pacific Avenue, Glendale, California 91204 • 213/245-0187

Irradiation Equipment • Counting Systems • Nuclear Applications

September 28, 1973

Rand Corporation
1700 Main Street
Santa Monica, California 90406

REPORT

MEASUREMENT OF X-RAYS ASSOCIATED WITH CLOSED CIRCUIT VIDEO MONITORS

RECEIVED
1973 OCT -3 PM 2:11
MAIL & RECORDS

The equipment checked was as follows:

Model	SNA-9C	Serial	244247
	SNA-14C		244549
	SNA-17C		244711
	SNA-17C		244740
	SNA-14C		244564
	SNA-17C		248494
	SNA-17C		248385

Instrumentation:

The instrumentation used to measure the emergent radiation from the above listed units was a Shepherd and Associates USM-1A rate meter, complete with SP-12 GM probe with window thickness of 1.4 mg/cm^2 and a window diameter of one square inch. The efficiency of the SP-12 probe is 2.5% as measured against a ^{55}Fe (5.9 kev. photon energy standard manufactured by Isotope Products Laboratories, with calibration traceable to National Bureau of Standards.)

Measurements:

No detectable radiation was found at any point on any unit. The sensitivity of the instrument was such that 80 counts per minute net count rate above background could easily be determined. Each unit was scanned

with 100% coverage on all six surfaces. In addition, backs were removed from the instruments and a survey made on all accessible internal parts.

82 counts per minute net (per square inch - the area of the detector - and a detector efficiency of 2.5%) represents a radiation field of 0.00032 mr/hr for 19 kev. X-rays.

Conclusions:

We can conclude that the external radiation levels at the surface of all instruments was significantly less than 5% above normal background. This means that an individual with his face pressed against the front plate of the monitor for an average of 16.8 hours per week for a one year period would receive significantly less than 0.5% additional radiation above normal background to the eyes or other vital organs.

J. L. Shepherd, Health Physicist

JLS:cp

Appendix B

Instruments That Have Already Been Administered to the Physically Handicapped and Mentally Retarded Children Using Our Current Teacher-Student Systems in the Madison Elementary School

Measures of Intelligence:

- Verbal Aptitude Test (from the Detroit Tests of Learning Aptitudes)
- Slosson Intelligence Test
- Goodenough-Harris Draw a Man Test

Achievement Test:

- Wide Range Achievement Test (WRAT)

Perception Tests:

- Wetman Auditory Discrimination Test
- Visual Motor Integration Test

School Attitude Measures:

- Behavior Rating Scales - Child Attitude Check List
- Burks' Behavior Rating Scale
- Madison Plan Placement Inventory

Appendix C

Entries From the Teacher's Log Regarding the Use of Current Teacher-Student System at Madison School

The entries below are taken from the log in which Mrs. Jady von der Lieth records daily how she and her students have used the current teacher-student system, what problems they have encountered and what successes they have had. Capital letters have been substituted for student names where the entry contained such names. A brief description of each child mentioned in the entries follows and should make those entries more meaningful to the reader.

A is six years old and partially sighted. The visual acuity in his better eye is about 20/1200.

B is eight years old. He is partially sighted, speech impaired and educable mentally retarded. The visual acuity in his better eye is 20/80.

C is nine years old. She is partially sighted and shows the effects of cerebral palsy on her right side. The visual acuity in her better eye is about 20/160.

D is eleven years old, and is educable mentally retarded.

E is twelve years old and is educable mentally retarded.

F is nine years old and is functionally deaf.

11-26-73

First day of operation.

11-28-73

Most of my students can read independently now--and are able to maneuver their X-Y Platform while reading. I still need to work directly with B, D and E on how to center their material and maneuver platform.

11-29-73

The room camera is working out well. I use it all the time--for puppet shows, board work, and lessons in front of the class.

11-30-73

I videotaped a lesson today, and it worked perfectly. I played it back for the class to see--they loved it. I'm trying something new with A. He has been having trouble participating in our art lessons, mainly because he can't see what he is doing. I tried letting him use his CCTV, and now he can see what he is cutting and drawing. He seemed to feel more successful and anxious to continue using the CCTV.

A is beginning to realize how useful his CCTV is--I had to move him to the art center for a group activity and he made the comment that he couldn't do the task without his TV--he's probably right.

12-3-73

We tried a great lesson. I brought in labels from some cans and jars. I enlarged them enough so the class could read them. I'll bet they never were able to read them before--these machines are fantastic. Anyway, we discussed the contents and ingredients--I asked them to find the weight in ounces. Afterwards, we drew pictures of the labels, and I'm going to have them paste them on their own cans. They enjoyed this.

12-3-73

The CCTV enables my class to do so much. A can now use scissors more proficiently--and is able to see what he is cutting.

Fantastic, we tried lots of new things--tracing Santa Claus using sticker books under the lens--even A could see what he was doing.

12-5-73

A relatively good day. We had lots of activity. The class is doing amazingly well. All of them can read with the X-Y Platform. I keep questioning them on how to operate their CCTV system so they can learn how to use the system independently.

12-7-73

I used the room camera and blackboard to explain the concepts "in the box", "on the box" and "under the box". Dumbo (a puppet) assisted the class who watched Dumbo place a plastic toy in the box, on the box or under the box. Eventually, they wrote the phrases on their own paper--according to where they saw Dumbo place the toy.

Another lesson we tried--the class was given a piece of paper with different parts of a face to cut out and paste an outline of a face. A, with the assistance of his machine, could actually see some of the smaller pieces and could cut them out and place them in their proper place. Even my slower students feel more comfortable using the CCTV doing this task.

12-11-73

A fun lesson--Reading Train. I made a train on the blackboard with words written in the cars. As the room camera followed the train (words), the train appears to move forward or backward. It proved to be very successful.

1-14-74

C has been working very hard. She is learning division now, so I've been using the split image with her. It works well, because she can see the problem and do the work on her monitor. I also use the split image with D and C when they are practicing their multiplications. I use my screen to write the following:

	4	8	10	6	3	2
x 2						

Then C and D write out the problem or answer on their screen 2 x 4 = 8, etc. It saves me time because I don't have to copy the complete problem. You can also use an overlay with the same chart.

1-18-74

I used the videotape machine today and we taped a sequence similar to yesterday's lessons. After a half hour, I played it back. It was so exciting for the class, because we now have sound with the video; and now they can hear themselves! It was a good lesson, and you could hear their responses clearly.

I also worked with F today. She came in for a reading lesson, and I used one of the puppets. She loved it and I even let her come up in front of the room camera and work Dumbo. Because she is deaf, she needs intensive drill in speech patterns and phonetic sounds, and the puppet is a great motivational device (so are the machines).

I found out something useful when I played back the tape. Many times my directions and instructions to the class are not explicit. This is something I had not realized, and something which I'd like to improve. The audio portion of the videotape may prove significant in helping students and teachers become better!

1-21-74

We practiced some handwriting and I noticed that my handwriting sheets are not printed dark enough and consequently the image is not reproduced.

1-25-74

Today during reading, B refused to read. It was only after I suggested that we use the CCTV, that he enthusiastically changed his mind. He read for 20 minutes without stopping and seemed to enjoy it. I feel the machine is an important motivational instrument for D and it allows D to see his results immediately. He can feel successful with the machine, and it enable him to share his ideas and answers with the rest of the class. D and E expecially need close interaction with other people.

1-28-74

We started a unit on animals and the class seems very excited about it. I read them a story using the CCTV and I realize the importance of having sound. The whole class can hear me now and I don't have to stand while I read the story. (I used to have to stand when we didn't have the microphone, because no one could hear me sitting down--hidden down under all the machines. I showed them the pictures, and afterwards I let them trace some of the pictures of the animals.

1-29-74

I let D monitor the control box today during phonics. He did very well, and he paid close attention to, not only his task, but also to our phonics lesson. This may prove to be a very conducive situation for D since he usually has difficulty working in small groups.

1-30-74

The class earned some free time so they decided to play games using their machines.

C and A read independently today and they both did very well. A loves to read and is now able to select a book from the library and read it using his CCTV.

2-4-74

During Math, I put 4 problems on the board, and then I had individual students come up and work the problems. I used the room camera--its a great way to keep everyone involved and, also, individualizes their math.

2-5-74

During phonics, I let B work the remote control (of the room camera) and he was fantastic. He was able to maneuver the controls and I didn't have to give him very many directions.

2-7-74

A has progressed very quickly in reading, he has finished "Around the City" and he is now using the Bookmark Series. D is also using a new reading book.

2-8-74

I have tried keeping D at the machine for longer periods. He is able to concentrate on his work easier, and does not tend to get out of his seat as often.